Forage News
Mississippi State University Extension Service

Utilization of Annual Ryegrass

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There are nearly 613,000 acres of annual ryegrass (planted alone, with legumes, or with small grains) in Mississippi, representing approximately 40% of the winter feeding. Annual ryegrass (ARG) pastures are used for stocker cattle, replacement heifers, and lactating dairy cows. About 70% of these ryegrass pastures are established by over-seeding into warm-season perennial grasses (bermudagrass, bahiagrass, or mixed pastures) to extend the grazing season. Annual ryegrass also is grown for silage and hay on poorly drained soils where small grains are not adapted.

Annual ryegrass is responsive to nitrogen (N) fertilizer and N can be applied at or before planting when ryegrass is planted in mixtures with small grains on a prepared seedbed. When planting ryegrass on a warm-season grass sod, N application should be delayed until the first frost (when warm-season grasses are dormant) to reduce grass competition. Nitrogen could also be applied in split applications depending on the intended usage of the forage produced. These split-applications can range from 50 to 60 lbs N per acre. Top-dress applications should be delayed to the four leaf stage (4 inches) to prevent seed damage. Split N applications could lead to more and more uniform forage production and distribution. This is not the case for phosphorous and potassium applications—they are recommended by the soil test. They should be applied at planting.

Table 1. Nutritional composition of annual ryegrass.

	Quality				Energy			
Forage Type	**Ca**	**CP**	**P**	**TDN**	**DE**	**ME**	**NE_m**	**NE_g**
	---------- % ----------				---------- Mcal kg^{-1} ----------			
Grazing, vegetative	0.65	15.0	0.41	60	2.65	2.17	1.31	0.74
Grazing, mature	—	5.8	—	58	2.56	2.10	1.24	0.68
Hay, early vegetative	0.62	15.2	0.34	60	2.65	2.17	1.31	0.74
Hay, early bloom	—	12.9	—	57	2.51	2.06	1.21	0.64
Hay, full bloom	—	6.6	—	55	2.43	1.99	1.14	0.58

All values expressed on a dry matter basis. Ca = Calcium; CP = Crude Protein; P = Phosphorus; TDN = Total Digestible Nutrients; DE = Energy; ME = Metabolizable Energy; NE_m = Net Energy for Maintenance; NE_g = Net Energy for Gain. Source: Hannaway et al., 1999.

Annual ryegrass is recognized as one of the highest quality cool-season annual grasses (**Table 1**). Ryegrass has a high dry matter digestibility (>65%), high protein (>20%), and many vitamins and minerals until late April or early May while still in the vegetative stage (leafy stage). Its quality usually exceeds the requirements for most classes of livestock animal gains. Because ryegrass is highly palatable, livestock may over consume. This quality can usually be maintained by using close grazing or rotational grazing. At the same time, these types of management improve forage production, and increase animal intake and animal performance.

Average daily gains (ADG) of 1.8 to 2.2 lbs for steers of 250 to 350 lbs and gains 300 to 450 lbs/ac are common when grazing ryegrass.

The majority of the annual ryegrass forage production is usually grazed. When annual ryegrass forage production exceeds utilization, ryegrass may be cut for hay, haylage, or silage. Some producers grow ARG alone or in mixtures with small grains and clovers specifically for hay or silage. Hay production is usually not a good alternative in March and April due to inclement conditions for curing. As with other species, silage quality is influenced greatly by maturity stage at harvest. For optimal silage production, it is recommended to cut annual ryegrass in the boot to early-heading stage and compromise between quality and quantity. Some dairy operations might feed green-chopped ryegrass to winter their herds, resulting in excellent milk production. Dairy cows with medium to high milking potential could produce 35 to 45 lbs of milk daily while grazing vegetative ryegrass.

Annual ryegrass is tolerant to frequent and intense grazing. When ryegrass is mixed with small grains, the small grains should be "grazed out" to release the ryegrass. It is recommended not to graze ryegrass shorter than three inches and allow it to recover for a period of three to four weeks during the active spring re-growth. It is important to be flexible in your stocking rate, either by varying the number of livestock or feeding supplemental hay. A strategy to use with cows is to limit grazing on annual ryegrass pastures. Dry cows can be allowed access to the pasture every third day and while wet cows every second day.

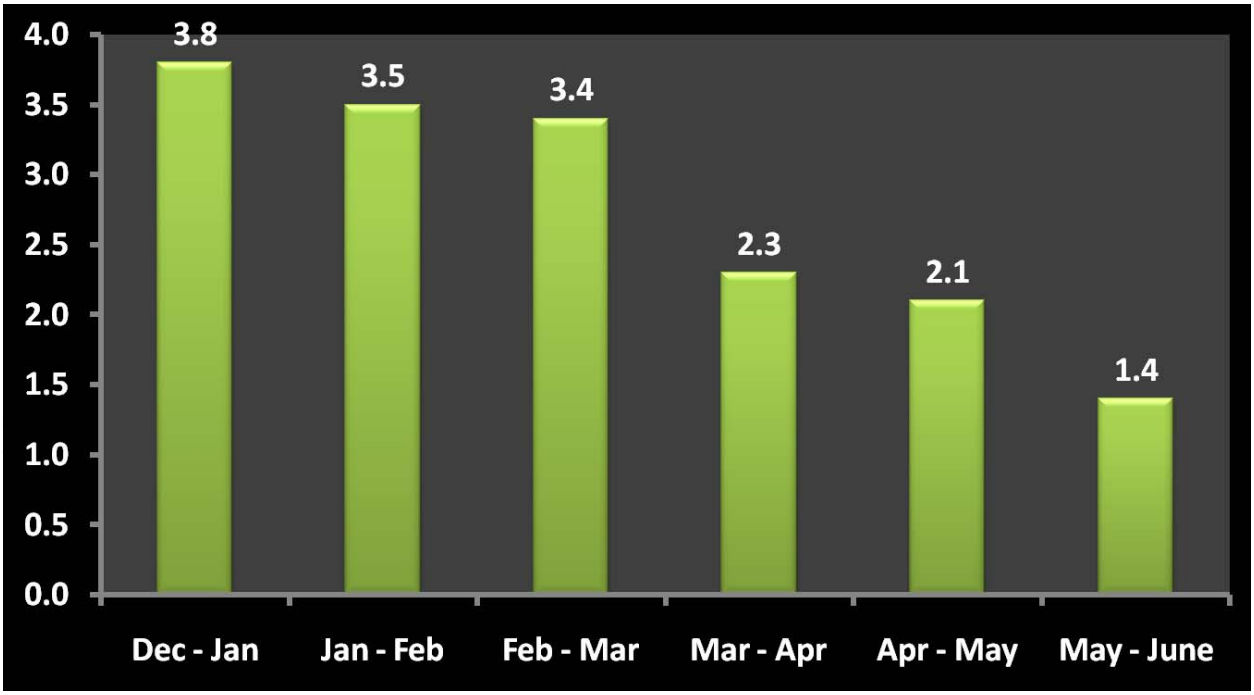

Figure 1. Period effect on average daily gain (ADG) of steers, estimated at 28-d intervals from December 2001 to June 2002, grazing Marshall ryegrass pastures treated with broiler litter or commercial N applied either pre-plant and incorporated into the soil, or post-emergence. Source: Macoon et al., 2008.

Management and utilization of annual ryegrass involves an integration of basic forage/animal production knowledge with the decision ability to implement various events in a timely manner. Stocking rate is the single most important factor controlling forage regrowth, animal performance, and potential economic returns in managing ryegrass (**Table 2**). Although stocking rate appears to be a "moving target", management can use some established "rules-of-thumb" for site specific areas. Making estimations for annual ryegrass forage production as well as removal by the type of grazing system and grazing efficiency will help to establish the initial stocking rate. These estimates could be then reviewed and adjusted later during the growing season to wisely adjust the stocking rate (buy or sell) and optimize animal gains. If ryegrass is to be grazed in the late fall, stock your pastures accordingly so that the low winter growth rate does not cause animal removal (**Fig. 1**). If necessary, supplement hay and/or protein during the shortage of hay production [usually 30 to 45 days in the winter time (December – January)]. Then, incorporate additional livestock in the spring to utilize excess spring growth.

Another important part of deciding the stocking rate is the method of grazing being used (continuous, rotational, strip grazing, etc.). Rotational grazing (two to three days grazing) in several paddocks enhances forage dry matter production when compared to continuous grazing with the same stocking rate. Initial high stocking rates (1000 to 1250 lb/ac BW) in the fall will increase the risk of having to provide hay during the mid-winter if not pastures are not rotated efficiently. These rates will set the "optimum" stocking rate for the 60 to 80 days grazing period in the spring in which the rate might reach 1700 to 2100 lb/ac BW.

Table 2. Comparison of steer performance for drylot and annual ryegrass (RG) at different stoking rates in Poplarville, Mississippi.

Growing Season	Steers	Grain Feeding	Weight				Cost[4]
			Purchase	Sale	Total Gain	ADG	
	- heads -	---- days ----	---------- lbs ----------				$/head
2003-04[1]							
Drylot[2]	18	145	499	962	463	3.20	196.08
RG_1[3]	24	0	496	955	459	3.16	98.32
RG_2[4]	18	49	493	941	448	3.09	136.41
2004-05[5]							
Drylot	11	142	394	816	422	2.97	127.12
RG_1	31	67	395	802	408	2.87	149.60
RG_2	23	89	394	812	418	2.95	115.23
2005-06[6]							
Drylot	20	97	414	699	285	2.94	98.64
RG_1	28	23	412	702	290	2.99	87.82
RG_2	21	23	420	696	276	2.84	65.10

[1]Preconditioned for 13 days on ryegrass and no preconditioning in subsequent years; [2]Drylot received only a total mixed ration (TMR); [3]RG_1 was stocked at 600 lb/ac; [4]RG_2 was stocked at 900 lb/ac; [5]Severed blast disease in 2004-05; [6]Severe drought in 2005-06. Note: Number of heads each season and varied due to size of pastures and desired stocking rates. The beginning average weights were 514 lbs in 2003-04, 384 lbs in 2004-05, and 402 lbs in 2005-06. Source: St. Louis and Little, 2008.

A livestock producer must choose a desired level of performance for the type of operation. Some of the questions that should be addressed are more gain per animal or more gain per acre? If the main goal is maximum gain per animal (2.5 to 3.0 lb/day), then each animal should have abundant high quality forage dry matter for each daily ration (possibly more refusal areas). If ADG goals are 1.8 to 2.0 lb/day then more spot grazing will be observed (less forage refusal areas). Initial stocking rates of 1100 to 1300 lb/ac in early to mid-February will allow higher animal gains. If stocking rates become heavier and prevent forage production above 4 inches, there is a chance that ADG might be limited to less than 2.0 lb/day. If clovers are incorporated into the system, higher stocking rates might be used since there is better quality forage. ADG for stockers under a moderate stocking rate (1200 lb/ac BW), should be approximately 2.0 to 2.5 lb/day, 2.5 to 3.0 lb/day for suckling caves, and 1.75 to 2.0 lb/day for yearling horses (**Fig. 2**). High stocking rates (1800 lb/ac BW) have shown to have greater ADG under rotational grazing.

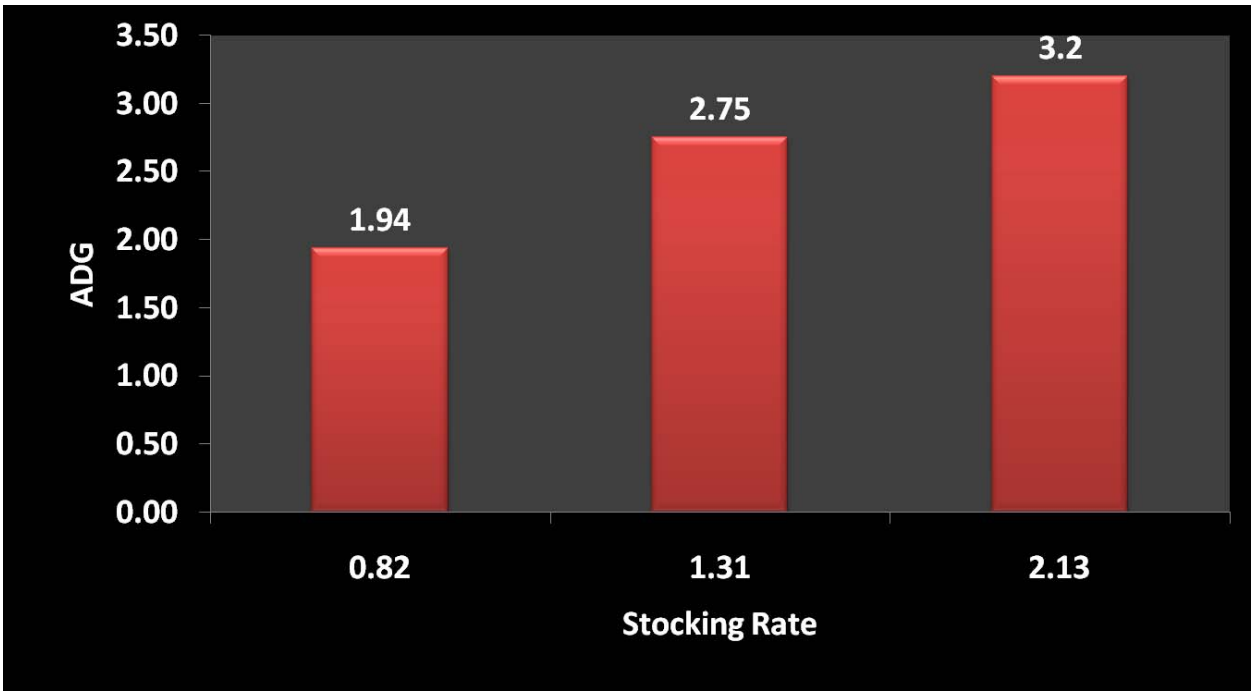

Figure 2. Ryegrass average daily gains of fall born cow/calf pairs (1500 lb BW) at different stocking rates per acre. Source: Vendramini et al., 2005.

Remember that the expectation for grazing ryegrass to optimize forage production and animal responses are site specific and affected by climate, variety, fertilization, and management practices. Achieving optimum grazing management and utilization of annual ryegrass that maximizes economic returns is not an especially easy task. The producer should set a base line for forage growth expectations for his farm operation, along with the desired stocking rates that will allow developing a grazing scheme that will allow for the greatest economic return and a good transition into the warm-season pastures for the rest of the year. Also, one of the most efficient grazing management schemes for ryegrass is to initiate with a stocking rate that allows for rapid recovery (adequate leafy biomass) during the winter.

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